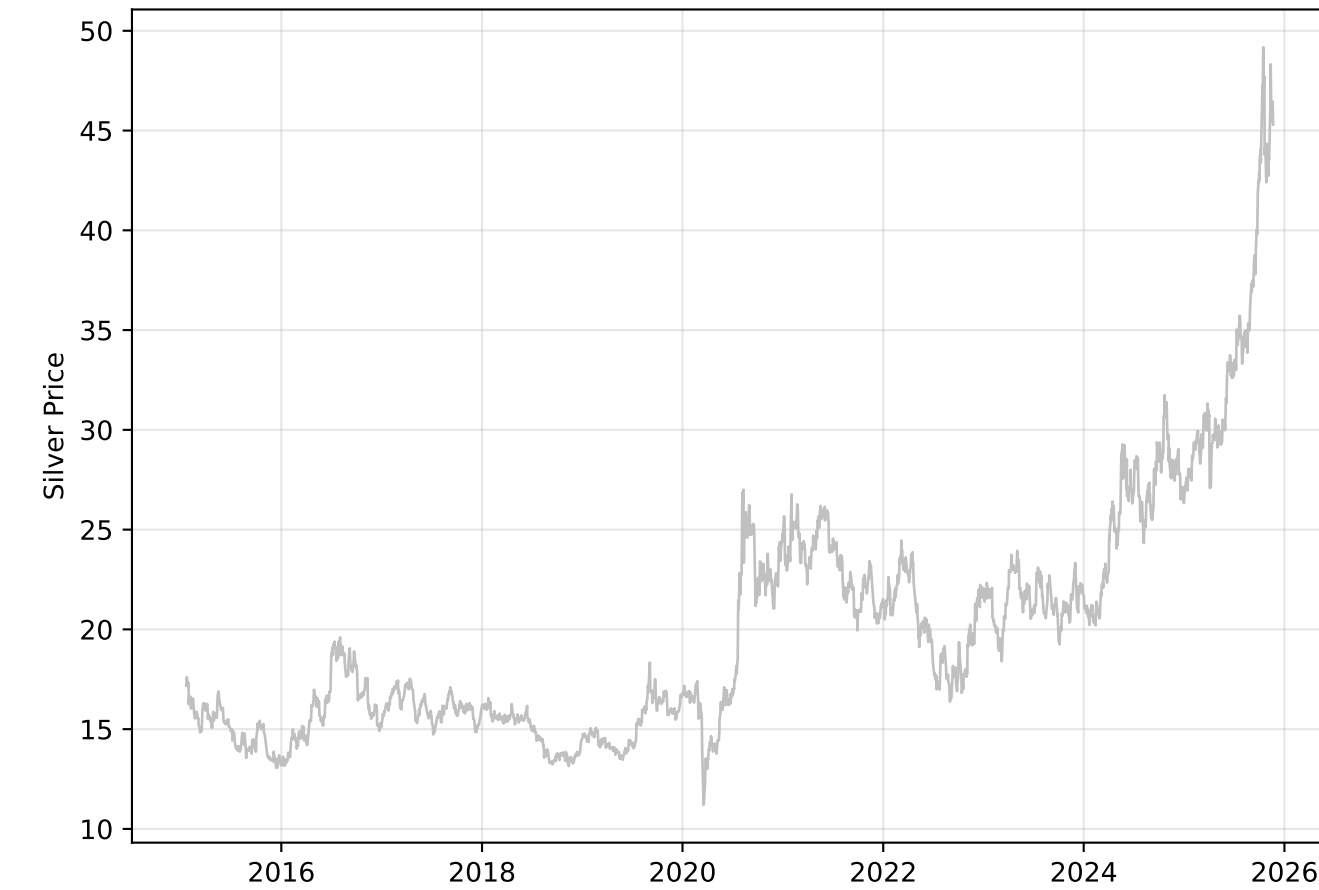
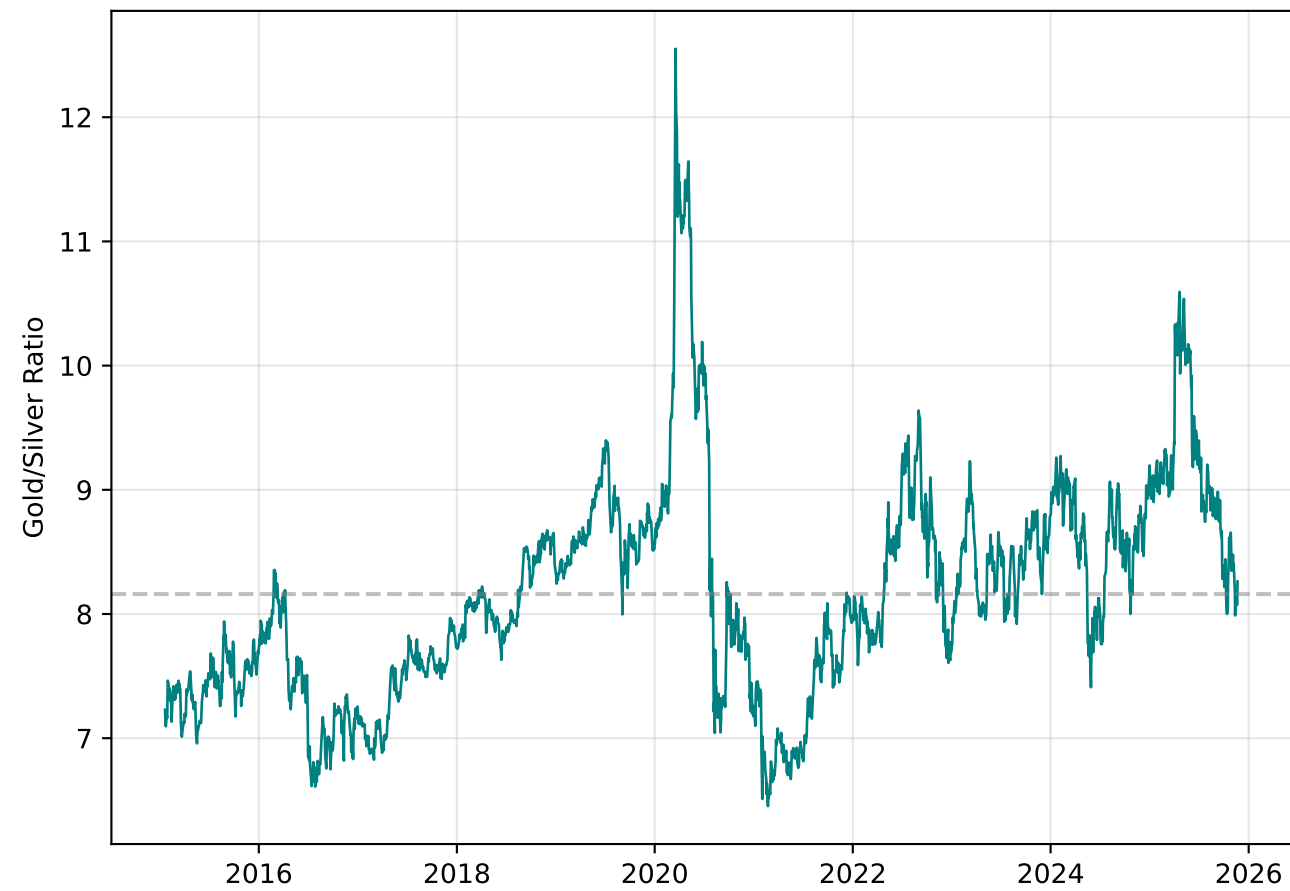
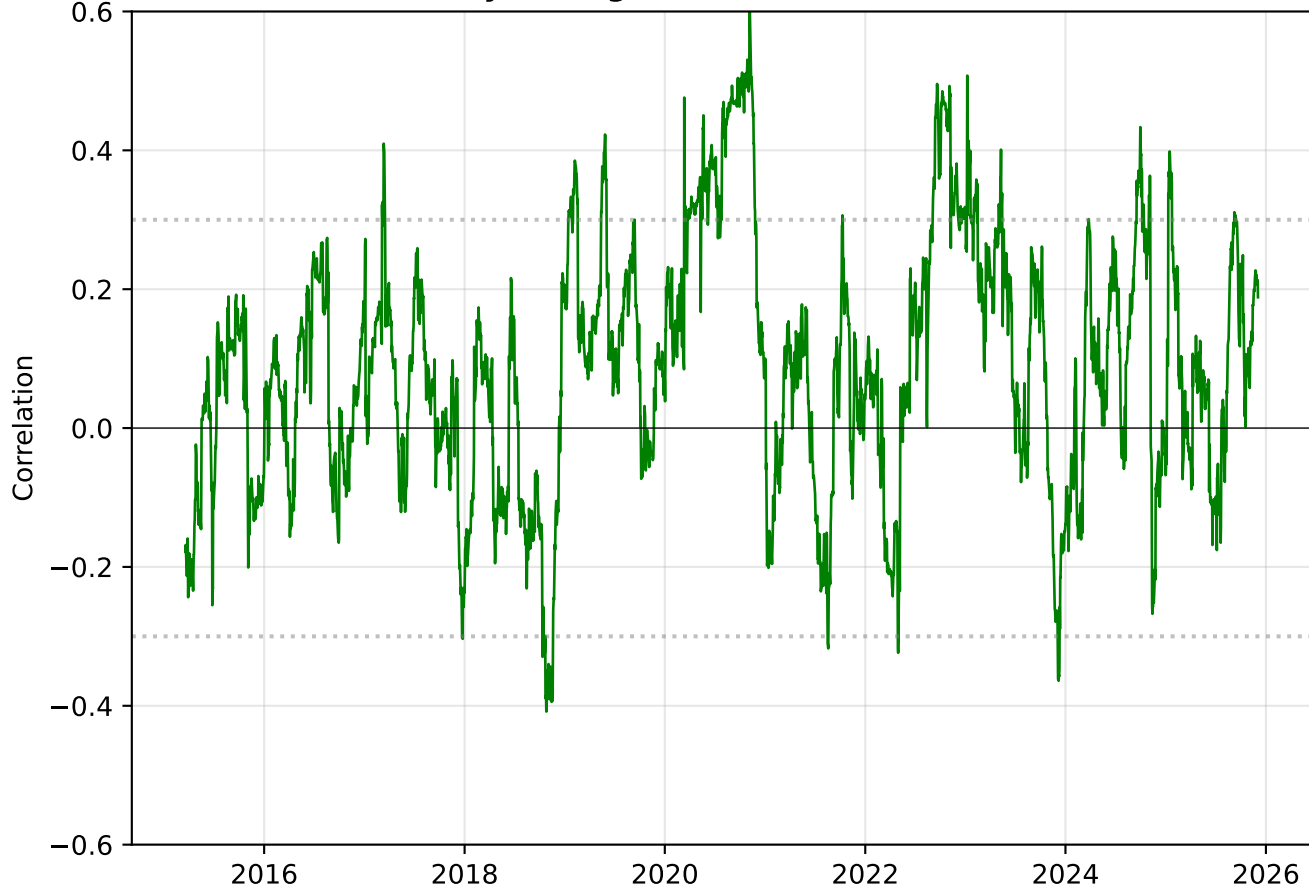
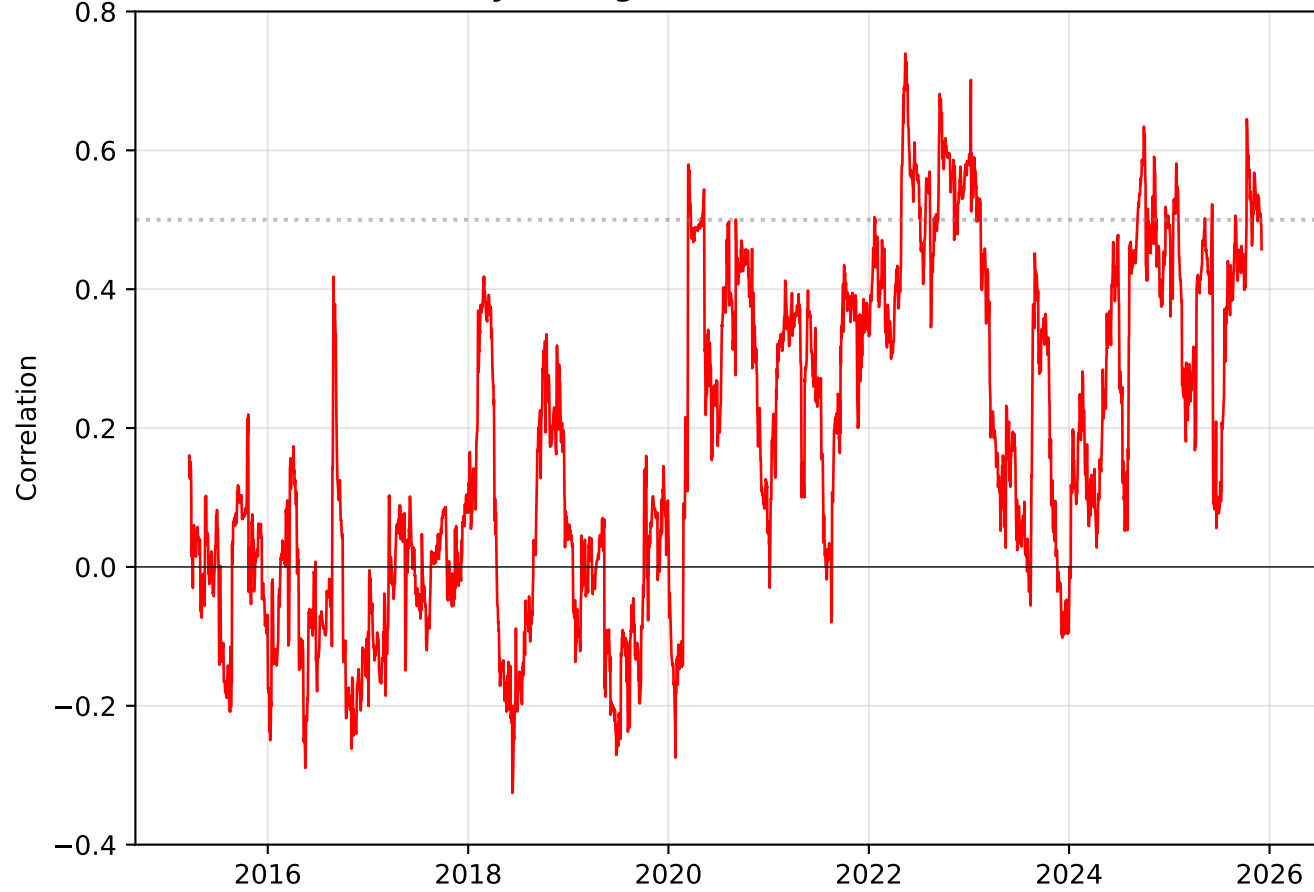
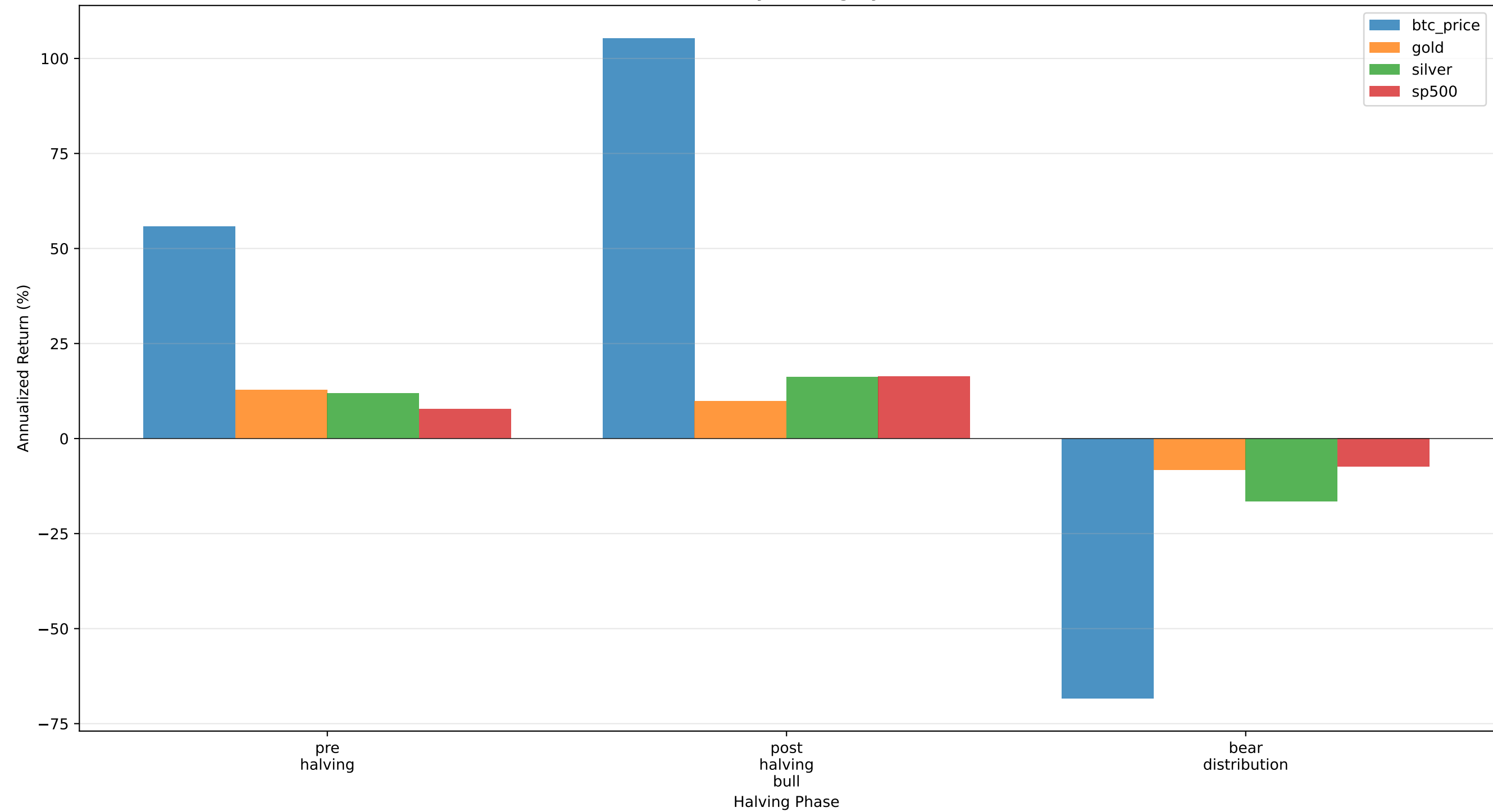


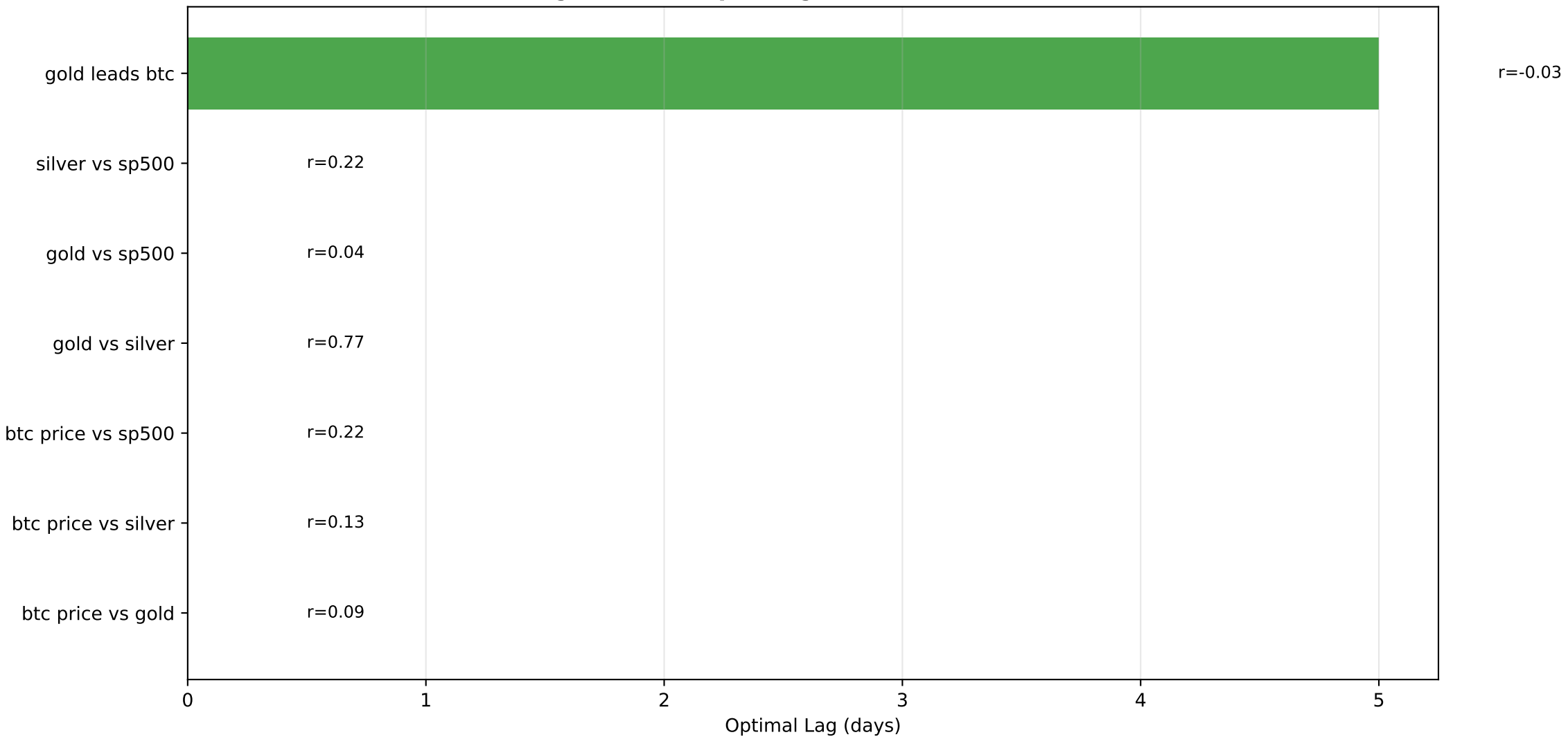
Bitcoin Price**Gold Price****Silver Price****S&P 500**

BTC/Gold Ratio**Gold/Silver Ratio****60-Day Rolling Correlation (BTC vs Gold)****60-Day Rolling Correlation (BTC vs S&P)**

Asset Returns by Halving Cycle Phase



Lead-Lag Relationships (Negative = Second Asset Leads)



STUDY 2: GOLD/SILVER/BTC/MACRO ANALYSIS - SUMMARY

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EXECUTIVE SUMMARY
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RESEARCH QUESTION: What drives gold/silver/BTC and which leads?
KEY FINDINGS:
1. RETURN CORRELATIONS: BTC-Gold: $r=0.097$ BTC-S&P: $r=0.240$ Gold-Silver: $r=0.765$
2. LEAD-LAG RELATIONSHIPS: btc_price_vs_gold: Synchronous btc_price_vs_silver: Synchronous btc_price_vs_sp500: Synchronous gold_vs_silver: Synchronous gold_vs_sp500: Synchronous silver_vs_sp500: Synchronous
3. GRANGER CAUSALITY (significant at $p<0.05$): silver_return \rightarrow gold_return: $p=0.0089$ sp500_return \rightarrow btc_price_return: $p=0.0266$ btc_price_return \rightarrow sp500_return: $p=0.0006$
4. COINTEGRATION: coint_log_btc_price_log_gold: No coint_log_btc_price_log_sp500: No coint_log_gold_log_silver: No coint_log_gold_log_sp500: No
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CONCLUSIONS:
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<ul style="list-style-type: none">• Gold and Silver are highly correlated ($r>0.8$) and cointegrated• BTC has low correlation with gold (~ 0.1) on daily returns• BTC-S&P correlation is moderate and has increased over time• Gold tends to lead other assets in risk-off environments• M2/liquidity correlations are spurious (shared time trend)
IMPLICATIONS FOR TRADING:
<ul style="list-style-type: none">• BTC is NOT 'digital gold' from correlation perspective• Gold-Silver ratio extremes can signal mean reversion trades• BTC behaves more like risk-on asset (correlates with S&P)• Monitor gold for macro risk signals